

REMARKS

Summary of the Office Action

Claims 14, 18-20, 23, 26, 31-33, 41, 45-48 and 50-56 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent Publication No. 2002/0115235 to Sawada (“Sawada”).

Claims 15-17, 21-22, 24-25, 27-30, 34, 36-40, 42-44 and 49 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Sawada in view of U.S. Patent No. 6,376,797 to Piwczyk et al. (“Piwczyk”).

Claims 34-35 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Sawada in view of U.S. Patent Application Publication No. 2003/0010275 to Radojevic et al. (“Radojevic”).

Summary of the Response to the Office Action

Applicants have amended claims 14-19, 21-26, 28, 30, 33-36, 39, 41-46 and 48-56.

Applicants have canceled claims 20, 40 and 47 without prejudice or disclaimer.

Claims 14-19, 21-39, 41-46 and 48-62 are pending, of which claims 57-62 are withdrawn.

All Claims Define Allowable Subject Matter

Applicants respectfully traverse the rejections under 35 U.S.C. § 102(b) and 35 U.S.C. § 103(a). Applicants have amended the claims to provide a different recitation relating to

Applicants' invention. Applicants submit that claims 14-19, 21-39, 41-46 and 48- 56 are patentable over Sawada, Piwczyk and Radojevic for at least the following reasons.

Sawada discloses, for example, forming a groove on a front face of a substrate along a line with a blade and cutting the substrate by grinding a rear face of the substrate along the line. See Fig. 12 of Sawada.

In contrast, Applicants' invention differs from Sawada in at least the following two ways:

Firstly, Applicants' invention relates to forming a modified region at least within the substrate neither melting on a laser light incident face of the object nor forming a groove due to melting on the laser light incident face by irradiating the substrate with laser light while positioning a light-converging point at least within the substrate, and causing the modified region to form a starting point region for cutting the substrate inside the substrate by a predetermined distance from the laser light incident face of the object.

Secondly, Applicants' invention relates to cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from the starting point region for cutting reaches a front face and rear face of the object to be processed.

Sawada also discloses forming a groove on the substrate along a line by irradiating the substrate with laser light. See Figs. 6 and 14 of Sawada. The laser process of Sawada is an ablation process wherein the laser light is absorbed on a surface of a substrate, so as to form a groove due to melting on a laser light incident face of the substrate, which raises the following problems:

Problem 1: Since the groove generates a gap that is the size of the groove, the number of chips which are separated from one substrate is decreased.

Problem 2: Since the same amount of gap as the groove is generated, chipping and cracking occurs on the substrate.

Problem 3: Since particles are generated by the groove, a chip which is obtained by dividing the substrate is contaminated with the particles.

In contrast, the present invention scarcely absorbs the laser light on a surface of the object but absorbs the laser light inside the object, without forming a groove due to melting on a laser light incident face of the object, causing the modified region inside the object. Therefore, the following beneficial effects are attained:

Effect 1: The number of chips separated from one substrate can be increased by narrowing the gap between the functional devices adjacent to each other.

Effect 2: Even if a substrate is cracked, the substrate can be prevented from chipping and cracking, because the cutting surfaces of the substrate are in close contact with each other.

Effect 3: Because no groove is formed, the chips which are obtained by dividing the substrate are not contaminated with particles.

Applicants respectfully submit that Sawada does not disclose at least the feature of neither melting on a laser light incident face of the object nor forming a groove due to melting on the laser light incident face, and that Piwczyk and Radojevic fail to overcome the deficiencies of Sawada.

Moreover, claims 19, 46, 52, 53, 54, 55 and 56 are directed to additional features that are not disclosed by Sawada, Piwczyk and Radojevic, in particular forming the modified region within the substrate and within the laminate, wherein the modified region formed within the substrate and the modified region formed within the laminate part are separated from each other.

Even still, claims 23, 39, 48 and 51 are directed to additional features that are not disclosed by Sawada, Piwczyk and Radojevic, in particular providing a front face of the substrate with a laminate part after the step of forming the starting point region for cutting, wherein the laminate part will be cut with the substrate.

Thus, Applicants respectfully request that the rejections under 35 U.S.C. § 102(b) and 35 U.S.C. § 103(a) be withdrawn, and the claims allowed.

CONCLUSION

In view of the foregoing, Applicants submit that the pending claims are in condition for allowance, and respectfully request reconsideration and timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicants' undersigned representative to expedite prosecution. A favorable action is awaited.

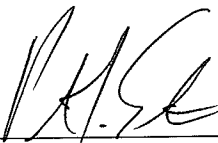
EXCEPT for issue fees payable under 37 C.F.R. § 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. § 1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account No. 50-0573. This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. § 1.136(a)(3).

Respectfully submitted,

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By: _____


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